

The listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Presently amended) A ~~pathogen~~ target detection system, the system comprising:
an immunocapture chamber integrated on a microfluidic device, the immunocapture chamber operable to capture a target provided to the immunocapture chamber through a microfluidic channel;
a DNA analysis ~~chamber comprising a DNA analysis mechanism-associated in fluid communication~~ with the immunocapture chamber, the DNA analysis ~~mechanism~~ chamber integrated on the microfluidic device, the DNA analysis mechanism operable to perform DNA analysis on the target; and
at least one pneumatically actuated diaphragm pump integrated on the microfluidic device and configured to pump a determined volume of fluid through the microfluidic channel into the immunocapture chamber and pump a determined volume of fluid from the immunocapture chamber into the DNA analysis chamber.
2. (Presently amended) The ~~pathogen~~ detection system of claim 1, wherein the DNA analysis ~~to~~ mechanism comprises PCR and CE.
3. (Canceled)
4. (Canceled)
5. (Presently amend) The ~~pathogen~~ detection system of claim 2, wherein the chamber for PCR is used for amplification of DNA obtained from lysing the target of interest.
6. (Presently amend) The ~~pathogen~~ detection system of claim 3 1, further comprising an etched capillary electrophoresis (CE) microchannel connected to the DNA analysis chamber for separation and detection of PCR amplicons.
7. (Presently amend) The ~~pathogen~~ detection system of claim 6, further comprising DNA preconcentration and clean-up chambers for purification of released pathogen genomic DNA or for desalting and preconcentration of amplified DNA before injection onto the CE microchannel.
8. (Presently amended) A ~~pathogen~~ target detection system, the system comprising:

immunocapture means integrated on a microfluidic device, the immunocapture means operable to capture a target provided through a microfluidic channel;

DNA analysis means ~~associated in fluid communication~~ with the immunocapture means, the DNA analysis means integrated on the microfluidic device, the DNA analysis means operable to perform DNA analysis on the target; and

at least one pneumatically actuated diaphragm pump integrated on the microfluidic device and configured to pump a determined volume of fluid through the microfluidic channel into the immunocapture means and pump a determined volume of fluid from the immunocapture means into the DNA analysis means.

9. (Presently amended) The ~~pathogen~~ detection system of claim 8, wherein the DNA analysis means comprises a PCR chamber connected through a second microfluidic channel to an immunocapture chamber comprising separate from the immunocapture means.

10. (Presently amended) The ~~pathogen~~ detection system of claim 9, wherein the PCR chamber is used for amplification of DNA obtained from lysing the target of interest.

11. (Presently amended) A ~~pathogen~~ detection system on a monolithic device, the system comprising:

a plurality of immunocapture chambers integrated on the monolithic device, ~~the each~~ immunocapture ~~chamber~~chambers operable to capture a target provided to the immunocapture ~~chamber~~chambers through one of a plurality of microfluidic channels;

a plurality of DNA analysis chambers, comprising DNA analysis mechanisms associated in fluid communication with the immunocapture chambers, the plurality of DNA analysis mechanisms integrated on the monolithic device, the plurality of DNA analysis mechanisms operable to perform DNA analysis on the target; and

a plurality of pneumatically actuated diaphragm pumps integrated on the monolithic device and configured to pump a determined volume of fluid through the microfluidic channels into at least one of the immunocapture chambers and pump a determined volume of fluid from at least one of the immunocapture chambers into at least one of the DNA analysis chambers.

12. (Presently amended) The ~~pathogen~~ detection system of claim 11, wherein the plurality of DNA analysis mechanisms comprise PCR and CE.

13. (Canceled)

14. (Presently amended) The ~~pathogen~~ detection system of claim ~~13~~ 8, further comprising a plurality of etched capillary electrophoresis (CE) microchannels for separation and detection of PCR amplicons.
15. (Presently amended) The ~~pathogen~~ detection system of claim 14, further comprising a plurality of integrated DNA preconcentration and clean-up chambers for purification of released pathogen genomic DNA or for desalting and preconcentration of amplified DNA before injection onto the CE microchannels~~-microchannel~~.
16. (Presently amended) The ~~pathogen~~ detection system of claim 11, wherein the immunocapture chambers are further operable to purify and concentrate the target.
17. (Presently amended) The ~~pathogen~~ detection system of claim 11, wherein the plurality of microfabricated immunocapture chambers are configured to hold selected antibodies.
18. (Presently amended) The ~~pathogen~~ detection system of claim 17, wherein the selected antibodies are held with beads, frits, sol-gels, gels, or polymer monoliths.
19. (Presently amended) The ~~pathogen~~ detection system of claim 17, wherein the selected antibodies are held with molded blocks of porous, surface functionalized polymer formed directly within the capture chambers.
20. (Presently amended) The ~~pathogen~~ detection system of claim 19, wherein the molded blocks are formed by photo polymerization of a precursor mixture including monomers and porogenic solvents.
21. (Presently amended) The ~~pathogen~~ detection system of claim 17, wherein ~~the~~ a plurality of 5 the immunocapture chambers are configured in a radially parallel manner.
22. (Presently amended) The ~~pathogen~~ detection system of claim 21, further comprising ring heaters coupled to the plurality of immunocapture chambers, the ring heaters operable to heat the plurality of immunocapture chambers to release the captured target.
23. (Presently amended) The ~~pathogen~~ detection system of claim 17, wherein the plurality of immunocapture chambers are configured on a ~~glass~~ fluidics layer.
24. (Presently amended) The ~~pathogen~~ detection system of claim 23, wherein the ~~glass~~ fluidics layer is coupled to a monolithic membrane layer.

25. (Presently amended) The ~~pathogen~~ detection system of claim 23, wherein the ~~glass~~ fluidics layer includes a plurality of etched channels, the etched channels operable to provide paths for fluid flow.
26. (Presently amended) The ~~pathogen~~ detection system of claim 25, wherein the ~~glass~~ fluidics layer and a pneumatic layer sandwich the membrane layer, wherein the pneumatic layer comprises pneumatic channels that actuate the diaphragm pumps using vacuum or pressure.
27. (Withdrawn) A method for pathogen analysis, the method comprising: providing a fluid analyte to a plurality of immunocapture chambers through microfluidic channels integrated on a monolithic device; capturing a target associated with the fluid analyte at the immunocapture chambers; and performing DNA analysis on the target using a plurality of DNA analysis mechanisms associated with the plurality of immunocapture chambers, the plurality of DNA analysis mechanisms integrated on the monolithic device.
28. (Withdrawn) The method of claim 27, wherein the plurality of DNA analysis mechanisms comprise PCR and CE.
29. (Withdrawn) The method of claim 27, wherein PCR mechanisms are included in chambers separate from the plurality of immunocapture chambers.
30. (Withdrawn) The method of claim 29, wherein the plurality of DNA analysis mechanisms include PCR chambers for amplification of DNA obtained from lysing the target of interest.
31. (Withdrawn) The method of claim 29, further comprising a plurality of etched capillary electrophoresis microchannels for separation and detection of PCR amplicons.
32. (Withdrawn) The method of claim 31, further comprising a plurality of integrated DNA preconcentration and clean-up chambers for purification of released pathogen genomic DNA or for desalting and preconcentration of amplified DNA before injection onto the CE microchannel.
33. (Withdrawn) The method of claim 27, wherein the immunocapture chambers are further operable to purify and concentrate target.
34. (Withdrawn) The method of claim 27, wherein the plurality of microfabricated immunocapture chambers are configured to hold selected antibodies.

35. (Withdrawn) The method of claim 34, wherein the selected antibodies are held with beads, sol-gels, gels, or polymer monoliths.
36. (Withdrawn) The method of claim 34, wherein the selected antibodies are held with molded blocks of porous, surface functionalized polymer formed directly within the capture chambers.
37. (Presently amended) An apparatus for detecting ~~pathogens~~ a plurality of targets, the apparatus comprising:
 means for providing a fluid analyte to a plurality of channels integrated on a monolithic device wherein each channel comprises:
~~an immunocapture chambers through microfluidic channels integrated on a monolithic device;~~ comprising means for capturing a target associated with the fluid analyte wherein a plurality of immunocapture chambers capture different targets; and
~~means for performing DNA analysis on the target using a plurality of a DNA analysis mechanism-mechanisms~~ associated with the plurality of immunocapture chambers comprising means for performing DNA analysis on the target ,the plurality of DNA analysis mechanisms integrated on the monolithic device; and
at least one pneumatically actuated diaphragm pump configured to pump a determined volume of fluid through at least one of the plurality of immunocapture chambers and pump a determined volume of fluid from at least one of the plurality of immunocapture chambers into the DNA analysis mechanism.
38. (New) The detection system of claim 1 wherein the target is a pathogen.
39. (New) The detection system of claim 1 wherein the pneumatically actuated diaphragm pump is actuated using vacuum.
40. (New) The detection system of claim 1 further comprising a waste collection channel in fluidic communication with the immunocapture chamber.
41. (New) The detection system of claim 1 further comprising a router integrated on the microfluidic device that controls a flow of fluid in the system.
42. (New) The detection system of claim 8 wherein the target is a pathogen.

43. (New) The detection system of claim 8 wherein the pneumatically actuated diaphragm pump is actuated using vacuum.
44. (New) The detection system of claim 8 further comprising a waste collection channel in fluidic communication with the immunocapture means.
45. (New) The detection system of claim 8 further comprising a router integrated on the microfluidic device that controls a flow of fluid in the system.
46. (New) The detection system of claim 11 wherein the target is a pathogen.
47. (New) The detection system of claim 11 wherein the pneumatically actuated diaphragm pumps are actuated using vacuum.
48. (New) The detection system of claim 11 further comprising a plurality of waste collection channels in fluidic communication with at least one of the immunocapture chambers.
49. (New) The detection system of claim 11 further comprising a plurality of routers integrated on the monolithic device that control a flow of fluid in the system.
50. (New) The apparatus of claim 37 wherein the target is a pathogen.
51. (New) The apparatus of claim 37 wherein the pneumatically actuated diaphragm pump is actuated using vacuum.
52. (New) The apparatus of claim 37 further comprising a waste collection channel in fluidic communication with the immunocapture chamber.
53. (New) The apparatus of claim 37 further comprising a router integrated on the monolithic device that controls a flow of fluid in the apparatus.